Weekly report

Introduction

This report has three main parts contained. The first part is paper reading, the purpose of which is to review some work related to the current processing topic, as well as to try to figure out the issue refers to the dimension dependent. This is still kept going on. The second is the corresponding coding work and experiments. Some results will be displayed later. The last word is pvis\eurovis paper collecting and patent writing, the prior is half done and the latter is still in processing.

Details

In order to review the work of VQ compression field, I found some papers. [1] gives us a survey of compression methods for direct volume rendering, GPU-based. From this survey, we know our method should be considered as near lossless at least, even lossless. Originated from this paper, some work refers to the codebook generation have been mentioned[2][3], they give me some ideas about how to produce a better codebook, like pca-based approaches. To improve the quality of the decoded data,[4][5] apply residual VQ, it means to perform VQ encoding of the residual data. We can also learn the differences between the VQ method and other methods, like hardware-support

methods(VTC), transform methods(DCT, wavelet). As an enlargement, I still have 5 papers to be read. This will give me more knowledge and background, maybe new ideas to the topic. While reading these papers, I tried to improve the original program to make it more suitable for experimenting, as well as some bugs fixing. The results are posted as below. The current codebook size is 65536. The empty blankets are still in computing(I wrote an bat file to execute it automatically last Friday, however, it stopped by an accident after two tests)

Data	Size of data	Type of data	Abs of residual < minVolumeValue/100 (voxels proportion)	Abs of residual value <0.00001 (voxels proportion)	Distortion of VQ (MSE, mean squared error)	SNR	Size of block
FhydrogenAtom128_128_128	128x128x128	FLOAT	99.9981%	99.9981%	0.000005	53.216299	2 1 1
FhydrogenAtom128_128_128	128x128x128	FLOAT	99.9962%	99.9962%	0.000010	50.205999	1 2 1
FhydrogenAtom128_128_128	128x128x128	FLOAT	99.9962%	99.9962%	0.000010	50.205999	1 1 2
FhydrogenAtom128_128_128	128x128x128	FLOAT	98.7159%	98.7159%	0.011849	19.263018	2 2 2
FhydrogenAtom128_128_128	128x128x128	FLOAT	100%	100%	0.00000	infinity	1 1 1
Fbonsai256_256_256	256x256x256	FLOAT					1 1 1
Fbonsai256_256_256	256x256x256	FLOAT					2 1 1
Fbonsai256_256_256	256x256	FLO					1

	x256	AT					21
Fbonsai256_256_256	256x256 x256	FLO AT					1 1 2
Fbonsai256_256_256	256x256 x256	FLO AT					2 2 2
ABSV360_181_26	360x181 x26	FLO AT					2 1 1
ABSV360_181_26	360x181 x26	FLO AT					1 1 2
ABSV360_181_26	360x181 x26	FLO AT					2 1 2
ABSV360_181_26	360x181 x26	FLO AT					1 1 1
CLWMR360_181_21	360x181 x21	FLO AT	100%	99.59 %	0.00000	150.0784	2 1 1
CLWMR360_181_21	360x181 x21	FLO AT	100%	100%	0.00000	187.9535	1 1 1

I think I should make some conclusions after the whole tests, it seems better now while the dimension dependent still exists in some datasets.

I collected all the resources related with pvis 2013. The counterpart of EuroVis will be done as possible as I can. I wil post them all as Weifeng did. The patent of volume walking (sphere volume rendering) is in writing.

Reference

[1] A survey ofcompressed GPU-based direct volume rendering

[2] A survey of vq codebook generation

[3] Pca based seeding for improved vector quantization

[4]Giga-voxel rendering from compressed data on a display wall

[5]Interactive large-scale volume rendering